



CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

An ISO 9001:2008 Certified Company

NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005



Job No.: CTCE/BBMP/W.No.09/MSM/WMM/Gradation/2015-16

04.01.2016

GRADATION FOR WMM MORTH TABLE-400-11

Customer : Asst. Executive Engineer, Vidyananyapura Sub Division, BBMP, Bangalore.

Agency : Mr. M. Srinivas Murthy,
17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.

Name of Work : Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09,
Vidyananyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015

Date of Testing : 04.01.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): 5000



Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	180	180	3.6	96.4	95-100
22.4	1575	1755	35.1	64.9	60-80
11.2	1125	2880	57.6	42.4	40-60
4.75	620	3500	70.0	30.0	25-40
2.36	450	3950	79.0	21.0	15-30
0.600	415	4365	87.3	12.7	8-22
0.075	345	4710	94.2	5.8	0-8

Note:

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04.01.2016

GRADATION FOR WMM MORTH TABLE-400-11

Customer : Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : Mr. M. Srinivas Murthy,
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Name of Work : Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09,
Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015

Date of Testing : 04.01.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): 5000



Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	155	155	3.1	96.9	95-100
22.4	1525	1680	33.6	66.4	60-80
11.2	1060	2740	54.8	45.2	40-60
4.75	715	3455	69.1	30.9	25-40
2.36	650	4105	82.1	17.9	15-30
0.600	415	4520	90.4	9.6	8-22
0.075	325	4845	96.9	3.1	0-8

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Date of Testing : 04.01.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): 5000



Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	180	180	3.6	96.4	95-100
22.4	1465	1645	32.9	67.1	60-80
11.2	1060	2705	54.1	45.9	40-60
4.75	655	3360	67.2	32.8	25-40
2.36	605	3965	79.3	20.7	15-30
0.600	455	4420	88.4	11.6	8-22
0.075	350	4770	95.4	4.6	0-8

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Job No.: CTCE/BBMP/W.No.09/MSM/WMM/AIV/2015-16

04.01.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.
Agency	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
Name of the Work	Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09, Vidyanarayapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	04.01.2016



Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	380	384	21.73
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	81	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	299	299	
4	Aggregate Impact value = percent fines	21.32	22.14	
	$100 * (W_2 / W_1) \%$			

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

Note:

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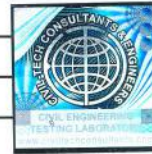
Job No.: CTCE/BBMP/W.No.09/MSM/WMM/AIV/2015-16

04.01.2016

Aggregate Impact Value

IS: 2386 Part IV

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Reference	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	04.01.2016



Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	385	22.03
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	83	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	299	299	
4	Aggregate Impact value = percent fines	21.73	22.34	
	$100 * (W_2 / W_1) \%$			

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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04.01.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
Name of Work	Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	04.01.2016



Result : Flakiness Index = 11.69%

Elongation Index = 13.54%

Result : Combined Flakiness & Elongation index 25.23%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.09/MSM/WMM/S-T/2015-16

04.01.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
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Reference	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	04.01.2016



Result : Flakiness Index = 12.18%

Elongation Index = 13.59%

Result : Combined Flakiness & Elongation index 25.77%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No: CTCE/BBMP/W.No.09/MSM/CSR-01/1047n/SDBC(QB)/2015-16

18.01.2016

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.
*AGENCY	:	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
*NAME OF THE WORK	:	Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	:	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	16.01.2016
PERIOD OF TESTING	:	18.01.2016



The results of the tests conducted on the bitumen sample using for Semi Dense Bituminous Concrete.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 °C, 1/10 mm	IS :1203 -1978 (RA-2009)	87	80 to 100
2	Softening point, °C	IS :1205 -1978 (RA-2009)	49	Min. 40
3	Ductility at 27°C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, °C	IS :1209 -1978 (RA-2009)	290	Min. 220

*Information is furnished by the Customer/Representative.

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VIDYARANI P.K.
Technical Manager



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Job No.: CTCE/BBMP/W.No.09/MSM/SDBC/AIV/2015-16

18.01.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.
Agency	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
Name of the Work	Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09, Vidyanarayapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	18.01.2016



Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	379	384	21.62
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	80	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	299	299	
4	Aggregate Impact value = percent fines $100 * (W_2/W_1)\%$	21.11	22.14	

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.09/MSM/SDBC/Shape_T/2015-16

18.01.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.	
Agency	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.	
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Reference	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015	
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)	
Type of Mix	Semi Dense Bituminous Concrete	
Date of Testing	18.01.2016	

Result : Flakiness Index = **11.93%**

Elongation Index = **13.57%**

Result : Combined Flakiness & Elongation index

25.50%

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.09/MSM/SDBC/Stripping/2015-16

20.01.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.
Agency	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
Name of the work	Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09, Vidyanarayapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	20.01.2016



Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	2.9	3.07	96.93
2	3.1		
3	3.2		



Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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20.01.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.
Agency	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
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Reference	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	20.01.2016



Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	$W_1 g$	2024	2025	2026	
2	Weight of basket suspended in water	$W_2 g$	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s g$	1274	1275	1276	
4	Weight of saturated surface dry aggregate in air	$W_3 g$	2017	2016	2019	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_s) g$	743	741	743	
6	Weight of oven dried aggregate	$W_4 g$	2008	2006	2005	
7	Specific Gravity	$W_4 / (W_3 - W_s)$	2.703	2.707	2.699	2.703
8	Apparent Specific gravity	$W_4 / (W_4 - W_s)$	2.736	2.744	2.750	2.743
9	Water Absorption	$((W_3 - W_4) * 100) / W_4$	0.45%	0.50%	0.70%	0.55%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.5%

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Job No.: CTCE/BBMP/W.No.09/MSM/SDBC/Bitumen/2015-16

20.01.2016

BITUMEN DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC : SP : 11 - 1984

CUSTOMER	Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.
AGENCY	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
NAME OF THE WORK	Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09, Vidyanarayapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
SAMPLE I/D	Roads at Canara Bank Layout, W No. 09
DATE OF TESTING	20.01.2016



BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	474.5	474.5
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25.5	25.50
7. Bitumen content in %	5.10	5.10
8. Average	5.10	

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Job No.: CTCE/BBMP/W.No.09/MSM/SDBC/Bitumen/2015-16

20.01.2016

GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS : 2386 and IRC : SP : 11 - 1984

CUSTOMER	Asst. Executive Engineer, Vidaranyapura Sub Division, BBMP, Bangalore.
AGENCY	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
NAME OF THE WORK	Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09, Vidaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
SAMPLE I/D	Roads at Canara Bank Layout, W No. 09
DATE OF TESTING	20.01.2016



GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	27.85	5.87	5.87	94.13	90-100
4.75	252.36	53.18	59.05	40.95	35-51
2.36	55.48	11.69	70.75	29.25	24-39
1.18	51.26	10.80	81.55	18.45	15-30
0.3	25.89	5.46	87.01	12.99	9-19
0.075	39.26	8.27	95.28	4.72	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	36.98	7.79	7.79	92.21	90-100
4.75	261.47	55.10	62.90	37.10	35-51
2.36	54.23	11.43	74.33	25.67	24-39
1.18	40.16	8.46	82.79	17.21	15-30
0.3	24.68	5.20	87.99	12.01	9-19
0.075	28.34	5.97	93.96	6.04	3-8

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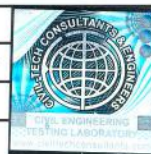
Job.No.: CTCE/BBMP/W.No.09/MSM/SDBC/AGG/2015-16

20.01.2016

Aggregate Gradation Test

IS : 2386 Part I

Customer	Asst. Executive Engineer, Vidyananyapura Sub Division, BBMP, Bangalore.
Agency	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
Name of the Work	Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09, Vidyananyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	20.01.2016



Total Weight of Sample: 5600 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
9.5	455	8.1	8.13	91.88	90-100	
4.75	2970	53.0	61.16	38.84	35-51	
2.36	720	12.9	74.02	25.98	24-39	
1.18	460	8.2	82.23	17.77	15-30	
0.3	365	6.5	88.75	11.25	9-19	
0.075	315	5.6	94.38	5.63	3-8	

Total Weight of Sample: 5650 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
9.5	375	6.6	6.64	93.36	90-100	
4.75	2955	52.3	58.94	41.06	35-51	
2.36	620	11.0	69.91	30.09	24-39	
1.18	430	7.6	77.52	22.48	15-30	
0.3	375	6.6	84.16	15.84	9-19	
0.075	515	9.1	93.27	6.73	3-8	

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Job No.: CTCE/BBMP/W.No.09/MSM/SDBC/Stability/2015-16

20.01.2016

TEST REPORT ON STABILITY OF MIX

Customer	:	Asst. Executive Engineer, Vidyanayapura Sub Division, BBMP, Bangalore.
Agency	:	Mr. M. Srinivas Murthy, # 17, (Opp. Jyothi Gas Godown), 6th Cross, Kurubarahalli, Bangalore - 86.
Name of the Work	:	Improvements & Asphaltting to Canara Bank Layout Balance Roads in Ward No.09, Vidyanayapura Sub Division, BBMP, Bangalore.
Reference	:	EE/BTP/BBMP/E-PMT/08(14236)WO/318/2014-15 Dated: 23.02.2015
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Semi Dense Bituminous Concrete
Date of Testing	:	20.01.2016



The results of the tests conducted on the Semi Dense Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-16)
1	Marshal Stability, Kn	8.45	8.85	8.2 Kn (min)
2	Marshal flow, mm	3.25	3.40	2 - 4
3	Percent air voids in Mineral Aggregate	3.80	4.15	3 - 5
4	Voids in Compacted Mix	13.65	13.80	13 - 15
5	Percent Voids filled with Bitumen	66.45	67.70	65 - 78
6	Density, g/cc	2.26	2.27	--

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